Amendment to the Claims

In the Claims:

Please cancel Claims 30-74.

Please amend Claim 5, and add new Claims 75-91 as follows:

1. (Original) A valve configured for generating a pressure pulse within a conduit by at least partially interrupting flow of a pressurized fluid circulating through the conduit, comprising:

(a) an inlet port configured to couple in fluid communication with the conduit through which the pressurized fluid is circulating;

(b) an outlet port configured to couple in fluid communication with the conduit through which the pressurized fluid is circulating;

(c) a plurality of fluid passages configured to selectively couple in fluid communication with said inlet port;

(d) a poppet that is actuated by the pressurized fluid to cycle between an open position and a closed position, such that when in said closed position, said poppet at least partially interrupts a flow of the pressurized fluid through said outlet port; and

(e) a pilot disposed within said poppet, said pilot being reciprocated back and forth between first and second positions during each cycle by the pressurized fluid, such that a position of said pilot determines which of said plurality of fluid passages is coupled in fluid communication with said inlet port.

2. (Original) The valve of Claim 1, wherein the plurality of fluid passages include at least one fluid passage configured to divert a flow of pressurized fluid upstream of said outlet port when said poppet is in the closed position, thereby substantially reducing a water hammer effect.

3. (Original) The valve of Claim 1, wherein the plurality of fluid passages include at least one fluid passage configured to divert a flow of pressurized fluid downstream of said outlet port when said poppet is in the closed position, thereby at least partially reducing a water hammer effect.

4. (Original) The valve of Claim 1, wherein said pilot is coaxially disposed within said poppet.

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5. (Currently Amended) The valve of Claim 1, wherein said plurality of fluid passages include:

(a) a first passage through which the pressurized fluid is applied to said poppet to cause said poppet to cycle to said closed position, thereby closing said outlet port, when said pilot is in said first position[[,]];

(b) a second passage through which the pressurized fluid is applied to said pilot to cause said pilot to shift to said second position when said poppet is in said closed position;

(c) a third passage through which the pressurized fluid is applied to said poppet to cause said poppet to cycle to said open position when said pilot is in said second position; and

(d) a fourth passage through which the pressurized fluid is applied to said pilot to cause said pilot to shift to said first position when said poppet is in said open position.

6. (Original) The valve of Claim 1, wherein a cycle time of the valve is a function of a size of said plurality of fluid passages.

7. (Original) The valve of Claim 1, wherein said pilot is configured to move with said poppet when said pilot is in said first position, such that when said poppet moves from said open position to said closed position, a momentum imparted to said pilot facilitates said pilot shifting to said second position.

8. (Original) The valve of Claim 1, wherein said poppet comprises a first bushing and a second bushing, said first and second bushings being configured to limit a range of motion of said pilot within said poppet.

9. (Original) The valve of Claim 1, further comprising a housing in which the valve is disposed.

10. (Original) The valve of Claim 9, wherein said housing is adapted to be incorporated in a drillstring.

11. (Original) The valve of Claim 9, wherein said housing is configured to isolate a section of conduit, such that the at least partial interruption of pressurized fluid in the conduit by the valve generates a negative pressure pulse in said section of conduit that is isolated.

12. (Original) The valve of Claim 11, wherein said housing comprises a high speed flow course adapted to couple said section of conduit that is isolated in fluid communication with a non-isolated section of conduit.

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13. (Original) The valve of Claim 12, wherein a cycle time required for the poppet to cycle between the open position and the closed position is less than or equal to a two-way travel time of an acoustic pressure wave in a length of the high speed flow course.

14. (Original) The valve of Claim 1, further comprising an on/off mechanism having an on position and an off position, such that when said on/off mechanism is in said off position, said poppet is held in said open position, preventing the valve from cycling.

15. (Original) The valve of Claim 14, wherein said on/off mechanism is sensitive to a pressure in the conduit, such that said on/off mechanism changes from said off position to said on position after the pressure within the conduit reaches a predetermined level.

16. (Original) The valve of Claim 1, wherein the at least partial interruption of the flow of pressurized fluid by actuation of the valve generates a pressure pulse that propagates away from the valve.

17. (Original) The valve of Claim 1, further comprising a frequency modulator configured to repeatedly vary the cycle rate of the valve.

18. (Original) The valve of Claim 17, wherein said frequency modulator comprises a variable volume in fluid communication with a timing shaft, said timing shaft being coupled with said pilot, such that a change in said variable volume produces a corresponding change in a motion of said pilot, thereby changing a cycling rate of the valve.

19. (Original) The valve of Claim 18, wherein said frequency modulator changes said variable volume after the valve completes each cycle.

20. (Original) The valve of Claim 18, wherein said frequency modulator comprises a rotary indexing mechanism that changes said variable volume after the valve completes each cycle, such that each complete revolution of said rotary indexing mechanism generates a substantially similar modification of the valve cycle.

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21. (Original) Apparatus for at least partially interrupting flow of a pressurized fluid that is circulating though a conduit, comprising:

(a) a housing; and

(b) a valve substantially enclosed by said housing, said valve comprising;

(i) an inlet port configured to couple in fluid communication with the conduit through which the pressurized fluid is circulating;

(ii) an outlet port configured to couple in fluid communication with the conduit through which the pressurized fluid is circulating;

(iii) a plurality of fluid passages configured to selectively couple in fluid communication with said inlet port;

(iv) a first member that is actuated by the pressurized fluid to cycle between an open position and a closed position, such that when in said closed position, said first member at least partially interrupts a flow of the pressurized fluid through the outlet port; and

(v) a second member disposed within said first member, the second member being reciprocated back and forth between first and second positions during each cycle by the pressurized fluid, a position of said second member determining which of said plurality of fluid passages is coupled in fluid communication with said inlet port.

22. (Original) The apparatus of Claim 21, wherein said plurality of passages comprises:

(a) a first passage through which the pressurized fluid is applied to said first member to cause said first member to cycle to said closed position, thereby closing the outlet port, when said second member is in said first position,

(b) a second passage through which the pressurized fluid is applied to said second member to cause said second member to shift to said second position when said first member is in said closed position;

(c) a third passage through which the pressurized fluid is applied to said first member to cause said first member to cycle to said open position when said second member is in said second position; and

(d) a fourth passage through which the pressurized fluid is applied to said second member to cause said second member to shift to said first position when said first member is in said open position.

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23. (Original) The apparatus of Claim 22, wherein said second member is configured to move with said first member, such that when said second member is in said first position and said first member moves from said open position to said closed position, the movement of said first member imparts a momentum to said second member, thereby urging said second member to move to said second position.

24. (Original) The apparatus of Claim 21, wherein said second member is disposed coaxially within said first member.

25. (Original) The apparatus of Claim 21, wherein said housing is configured to isolate a portion of the conduit, such that when the portion of the conduit that is isolated is coupled in fluid communication with a portion of the conduit that is not isolated by a high velocity fluid flow course, interruption of pressurized fluid in the conduit by cycling the valve causes a negative pressure pulse in the section that is isolated.

26. (Original) The apparatus of Claim 25, wherein the high velocity flow course is defined at least in part by the housing.

27. (Original) The apparatus of Claim 21, wherein when the conduit is disposed inside a borehole, the at least partial interruption of the flow of pressurized fluid caused by the valve generating a seismic pulse that propagates into a formation surrounding the borehole adjacent to the valve, the seismic pulse enabling information about the formation and about a location of the valve to be determined.

28. (Original) The apparatus of Claim 21, wherein when the apparatus is disposed at a closed end of the conduit, the at least partial interruption of the flow of pressurized fluid by the valve generates a pressure pulse that propagates upstream of the valve while the valve is closed, thereby transferring a momentum of the fluid to the apparatus to urge the apparatus to move in a downstream direction.

29. (Original) The apparatus of Claim 21, wherein said plurality of passages comprises at least one fluid passage configured to divert a flow of pressurized fluid away from said outlet port when said first member is in the closed position, thereby at least partially reducing a water hammer effect.

30.-74. (Currently Cancelled)

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75. (New) A method for generating pressure pulses within a conduit by at least partially interrupting flow of a pressurized fluid circulating through the conduit, comprising the steps of:

(a) introducing a pressure activated flow interruption valve into the conduit, the valve being configured to periodically at least partially interrupt a flow of the pressurized fluid in the conduit;

(b) circulating the pressurized fluid through the conduit; and

(c) directing the pressurized fluid through the valve to cyclically actuate the valve, actuation of the valve being implemented by:

(i) using the pressurized fluid to cause a first valve member to cycle between an open position and a closed position, such that when in the closed position, the first valve member at least partially interrupts a flow of the pressurized fluid through the valve, thereby at least partially interrupting a flow of the pressurized fluid in the conduit; and

(ii) using the pressurized fluid to cause a second valve member disposed within the first valve member to reciprocate between a first position and a second position, a position of the second valve member controlling the cycling of the first valve member by the pressurized fluid.

76. (New) The method of Claim 75, further comprising the step of redirecting at least a portion of the flow of the pressurized fluid within the conduit such that the step of directing the pressurized fluid through the valve to cyclically actuate the valve to at least partially interrupt the flow of the pressurized fluid in the conduit does not completely interrupt a circulation of the pressurized fluid in the conduit, thereby at least partially reducing a water hammer effect.

77. (New) The method of Claim 76, wherein the step of redirecting at least a portion of the flow of the pressurized fluid within the conduit comprises the step of redirecting at least a portion of the flow of the pressurized fluid upstream of a portion of the conduit where the pressure activated flow interruption valve at least partially interrupts the flow of the pressurized fluid in the conduit.

78. (New) The method of Claim 76, wherein the step of redirecting at least a portion of the flow of the pressurized fluid within the conduit comprises the step of redirecting at least a portion of the flow of the pressurized fluid downstream of a portion of the conduit where the pressure activated flow interruption valve at least partially interrupts the flow of the pressurized fluid in the conduit.

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79. (New) The method of Claim 75, wherein the step of using the pressurized fluid to cause the second valve member disposed within the first valve member to reciprocate between the first position and the second position comprises the step of causing the second valve member to move coaxially within the first valve member.

80. (New) The method of Claim 75, wherein the step of directing the pressurized fluid through the valve to cyclically actuate the valve comprises the steps of:

(a) directing the pressurized fluid through a first passage to cause the first valve member to cycle to the closed position, when the second valve member is in the first position;

(b) directing the pressurized fluid through a second passage to cause the second valve member to shift to the second position when the first valve member is in the closed position;

(c) directing the pressurized fluid through a third passage to cause the first valve member to cycle to the open position when the second valve member is in the second position; and

(d) directing the pressurized fluid through a fourth passage to cause the second valve member to shift to the first position when the first valve member is in the open position.

81. (New) The method of Claim 80, further comprising the step of controlling a cycle time of the valve by controlling a size of the first, second, third and fourth passages.

82. (New) The method of Claim 75, further comprising the step of using the first valve member to impart a momentum to the second valve member when the first valve member moves from the open position to the closed position, thereby facilitating a movement of the second valve member from the first position to the second position.

83. (New) The method of Claim 75, further comprising the step of isolating a section of the conduit, such that the at least partial interruption of the pressurized fluid in the conduit by the pressure activated flow interruption valve generates a negative pressure pulse in the section of conduit that is isolated.

84. (New) The method of Claim 75, further comprising the step of selectively holding the first valve member in the open position, thereby preventing the valve from cycling.

85. (New) The method of Claim 84, wherein the step of selectively holding the first valve member in the open position comprises the step of holding the first valve member in the open position as a function of pressure, such that the valve does not begin to cycle until a pressure within the conduit reaches a predetermined level.

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86. (New) The method of Claim 75, further comprising the step of selectively varying a cycle rate of the valve.

87. (New) The method of Claim 86, wherein the step of selectively varying a cycle rate of the valve comprises the step of introducing a portion of the pressurized fluid in the valve into a variable volume, such that a change in the variable volume produces a corresponding change in a motion of the second valve member, thereby changing a cycling rate of the valve.

88. (New) The method of Claim 86, wherein the step of selectively varying a cycle rate of the valve comprises the step of varying the cycle rate of the valve after the valve completes each cycle.

89. (New) The method of Claim 86, wherein the step of selectively varying a cycle rate of the valve comprises the step of varying the cycle rate according to a repetitive pattern.

90. (New) A method for generating pressure pulses within a conduit by at least partially interrupting flow of a pressurized fluid circulating through the conduit, comprising the steps of:

(a) introducing a pressure activated flow interruption valve into the conduit, the valve being configured to periodically interrupt a flow of the pressurized fluid in the conduit, a flow of the pressurized fluid through the valve causing the valve to cycle between an open position and a closed position, such that when in the closed position, the valve at least partially interrupts a flow of the pressurized fluid through the conduit;

(b) circulating the pressurized fluid through the conduit; and

(c) directing the pressurized fluid through the valve to cyclically actuate the valve, such that:

(i) a first valve member is actuated by the pressurized fluid to cycle between a first position and a second position, such that when in the second position, the first valve member at least partially interrupts a flow of the pressurized fluid through the valve, causing the valve to be in the closed position; and

(ii) a second valve member disposed within the first valve member is reciprocated back and forth between another first position and another second position during each cycle by the pressurized fluid, the second valve member controlling actuation of the first valve member by the pressurized fluid.

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91. (New) A method for generating pressure pulses within a conduit by at least partially interrupting flow of a pressurized fluid circulating through the conduit, comprising the steps of:

(a) coupling a pressure activated flow interruption valve to the conduit, the valve being configured to periodically interrupt a flow of the pressurized fluid in the conduit, a flow of the pressurized fluid through the valve causing the valve to cycle between an open position and a closed position, the pressure activated flow interruption valve comprising:

(i) a poppet that is actuated by the pressurized fluid to cycle between an open position and a closed position, such that when in the closed position, the poppet at least partially interrupts a flow of the pressurized fluid through the valve; and

(ii) a pilot disposed within the poppet, the pilot being reciprocated back and forth between first and second positions during each cycle by the pressurized fluid, such that a position of the pilot controls the pressurized fluid that actuates the poppet;

(b) circulating the pressurized fluid through the conduit; and

(c) directing the pressurized fluid through the valve to cyclically actuate the valve, thereby periodically interrupting a flow of the pressurized fluid in the conduit as the valve cycles between the open position and the closed position.

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